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RHIZOSPHAERA NEEDLECAST

Rhizosphaera needlecast is a common disease that causes premature discoloration, death, and shedding of needles on several conifers in Connecticut landscapes and in Christmas tree plantations. Several species of spruce (*Picea*) are the most common hosts, with Colorado and Engelmann spruce sustaining the most damage in the landscape. Rhizosphaera needlecast is an occasional problem on pine (e.g., Austrian, mugo, and Eastern white), Douglas-fir, and true fir (e.g., noble, silver). This disease is primarily a problem on tree species growing outside of their natural ranges and is rarely found in natural forests.

SYMPTOMS AND DISEASE DEVELOPMENT

Rhizosphaera needlecast is caused by the fungus *Rhizosphaera kalkhoffii*. Current-year needles become infected in May and June, but symptoms do not appear until late summer, fall, or the following spring. In late summer, infected current-year needles appear mottled or speckled, often with dull yellow or reddish blotches. Diagnostic symptoms may develop in early September but typically occur in late winter or early spring, when infected needles turn a distinctive lavender or purplish-brown (Figure 1). At that time, pinpoint black fruiting bodies of the fungus called pycnidia

emerge out of the stomates of infected needles. These appear as rows of fuzzy black spots (Figure 2) and are easily distinguished from rows of white stomates on healthy needles (Figure 3) using a hand lens. As the fruiting bodies emerge from the stomates, white waxy caps are sometimes visible on these structures (Figure 4). During periods of rain and wet weather, conidia (spores) of the fungus ooze out of the pycnidia (Figure 5). Spores are easily dispersed by wind-driven rain and splashed onto newly developing needles where infection occurs.



Figure 1. Characteristic purplish-brown color of infected spruce needles.

The infection period for this disease can be quite long since release of spores begins in spring and can continue until autumn. The

fungus usually attacks needles on the lower branches first, since needles on these branches tend to stay wet for longer periods. Infections then gradually progress up the tree as spores are splashed to needles on nearby branches or twigs. On severely diseased trees, the infected needles usually fall during their second summer, leaving only the current season's growth on the bottom half. Branches die when they are defoliated for 3-4 consecutive years.

Trees of any size are susceptible to infection. The fungus over winters in infected needles on the tree and in fallen needles. Under epidemic conditions, the fungus may kill lower branches. In extreme cases, *Rhizosphaera* needlecast can result in tree death.



Figure 2. Pinpoint black fruiting bodies emerging from stomates of spruce needles.



Figure 3. Healthy spruce needle with rows of white stomates.

Rhizosphaera needlecast is often first evident in sites that are naturally moist, have poor air drainage, or are adjacent to taller trees that reduce wind drying of the foliage. *Rhizosphaera* typically infects newly emerging needles of the current season but can attack needles of any age that are dying or stressed by other plant pests or

environmental factors. It is well documented that *Rhizosphaera* needlecast is more severe in drought-stressed trees.



Figure 4. Infected spruce needle with black fruiting bodies of the fungus (pycnidia) emerging through the stomates. Note white waxy caps on some pycnidia (arrow)



Figure 5. Closeup of spores (conidia) oozing out of the fruiting bodies.

MANAGEMENT STRATEGIES

Rhizosphaera needlecast can be managed through the combined use of culture, sanitation, resistance, and fungicide sprays. Although this disease can reduce the marketability or aesthetic value of trees, it is usually not considered life threatening. Cultural methods for management include using healthy stock and maintaining tree vigor by following sound cultural practices. It is also helpful to select appropriate planting sites (slopes with good air drainage) and maintain weed control in

order to promote good air drainage and conditions that help to dry the lower branches.

Sanitation includes pruning and removing any dead or dying branches. All prunings should be removed from the vicinity of the tree, since the fungus can mature and continue to sporulate (produce conidia) on branches that are cut. It is often necessary to sacrifice and remove heavily symptomatic trees to reduce the level of inoculum, especially if other susceptible hosts are nearby. This is especially important in a Christmas tree plantation. Human activities and tools can also spread fungal spores from tree to tree. Therefore, it is helpful to disinfest tools between trees (or cuts) with household bleach (1 part bleach: 9 parts water), 70% alcohol, or one of the commercially available compounds such as Greenshield ®. It is also useful to avoid pruning or shearing when the foliage is wet in order to limit spread of the disease.

When possible, it is beneficial to use resistant varieties. Colorado and Englemann spruce are most sensitive, white and Sitka, spruce are intermediate, and black, Norway, and Serbian spruce are relatively resistant.

The final strategy for disease management involves the proper selection, timing, and application of fungicide sprays. Thorough coverage of all parts of the tree is necessary. Among the compounds registered for use in Connecticut are chlorothalonil, chlorothalonil + fenarimol, copper hydroxide, and mancozeb. The labels contain information on dosage rates and safety precautions. Applications are made before or when new growth is approximately 1½” long and again 3 weeks later. Additional applications may be necessary in years with excessive rainfall. The pesticide labels will contain information

on dosage rates, application intervals, and safety precautions.

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